Paper No. 8

TITLE: BIOCHEMICAL CHANGES DURING TOBACCO SEED GERMINATION

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ABSTRACT: Seeds of Nicotiana tabacum L. cv Speight G-28 were washed with deionized water and extracted with hot 80% ethanol following varying periods of imbibition under light or darkness at 25 ± 1°C. Seed washings were used for conductivity measurement followed by freeze-drying and dissolution in 80% ethanol. The ethanol soluble fractions of seed washings and extractions were used for quantitation of amino acids (AA), hexouronic acids (HUA), nucleotides (NT), polyphenols (PP), reducing sugars (RS), and total sugars (TS). In seeds, HUA, RS and TS levels changed little until radicle protrusion (96 hrs) in light but increased rapidly thereafter. NT and PP levels also increased under light after an initial lag of 48 hrs. None of these components changed under darkness due to lack of germination. The AA level, however, increased under both light and darkness after a lag of 24 hrs, the increase being greater under light. In seed washings, the AA level also increased, thus contributing to increased conductivity, during the first 144 hrs under light or darkness followed by a decline. Changes in HUA and TS levels were inconsistent whereas NT and PP levels remained unchanged during the first 72 hrs under light or darkness but thereafter declined under light and increased under darkness. Early changes in AA level are indicative of the involvement of protein metabolism during the initial phase of germination. Subsequent changes in NT and PP levels are consistent with this because of their relationship to protein metabolism via nucleic acid and AA metabolism, respectively.

REVIEW: The objective of the research described in this paper is to relate the biochemical changes to those physical changes observable by microscopy and electron microscopy during the germination of tobacco seeds. The radicle protrusion (initial root extension from seed) was observable as seed cover splitting at about 72 hours. No other changes were seen before 72 hours at this level. However, ultrastructural studies showed some changes after 48 hours. The paper showed that no changes in amounts were observed for those compound classes studied in periods of less than 48 hours. Thus, it appears that those compound classes selected for observation and the methods of measurement are not any more sensitive as a probe than microscopy for following seed germination in its early stages.

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